

# Topics in Primary Care Medicine

---

## Falls in the Elderly: A Clinical Approach

LAURENCE Z. RUBENSTEIN, MD, Sepulveda, California

*"Topics in Primary Care Medicine" presents articles on common diagnostic or therapeutic problems (such as dizziness, pruritus, insomnia, shoulder pain and urinary tract infections) encountered in primary care practice that generally do not fall into well-defined subspecialty areas and are rarely discussed thoroughly in medical school, house staff training, textbooks and journals. Often the pathophysiology is poorly understood and clinical trials to assess the effectiveness of diagnostic tests or therapies may be lacking. Nevertheless, these problems confront practitioners with practical management questions.*

*The articles in this series discuss new tests and therapies and suggest reasonable approaches even when definitive studies are not available. Each article has several general references for suggested further reading. We hope this series is of interest and we welcome comments, criticisms and suggestions.*

—BERNARD LO, MD  
STEPHEN J. McPHEE, MD  
Series' Editors

The tendency to fall is a serious problem associated with aging. Both the incidence of falls and the severity of complications rise steadily with age. Accidents are the fifth leading cause of death in people older than 65, and falls constitute two thirds of these accidental deaths; 72 percent of deaths due to falls in the United States occur in the 10 percent of the population that is 65 or older. About a third of this age group living at home will fall each year, and about 1 in 40 of them will be admitted to hospital. Of those who were in hospital following a fall, only about half will be alive a year later. Repeated falls are a common reason for admission of previously independent elderly persons to long-term care institutions. Among elderly persons in institutions, 10 percent to 25 percent will have a serious fall each year.

This high morbidity and mortality might be reduced in several ways. The US Public Health Service has estimated that two thirds of deaths due to falls are potentially preventable. Identifying and eliminating environmental risks in homes or institutions may prevent those falls due primarily to environmental causes. Adequate medical evaluation and treatment for underlying medical conditions might prevent many other falls. Finally, many patients who have irreversible medical problems causing their falls could still benefit from learning adap-

tive behavior to minimize the number and severity of falls. This article will present a systematic approach for determining why an elderly person falls and for minimizing the chances of recurrence.

### Causes of Falls

Table 1 lists the major causes of falls. Accidents are the most common cause of falls, accounting for 40 percent to 50 percent in most series. However, many falls attributed to accidents are really due to the interaction between increased susceptibility to accidents because of accumulated effects of age and environmental hazards. Older people have stiffer, less coordinated and more dangerous gaits than do younger people. Posture control, body-orienting reflexes, muscle strength and tone, and height of stepping all decrease with aging and impair ability to avoid a fall after one trips unexpectedly. Impairments of vision, hearing and memory, also associated with aging, tend to increase the number of trips and stumbles. In addition to the increased vulnerability of elderly people, avoidable environmental hazards are frequent. Elderly people who live at home usually face many hazards which can be ameliorated (Table 2). Similarly for the 5 percent of those who live in institutions, many correctable environmental factors have been associated with falls (Table 3).

---

Refer to: Rubenstein LZ: Falls in the elderly: A clinical approach (Topics in Primary Care Medicine). West J Med 1983 Feb;138:273-275.

From the Geriatric Evaluation Unit, and GRECC, Veterans Administration Medical Center, Sepulveda, Calif, and the Department of Medicine, University of California, Los Angeles, School of Medicine.

Reprint requests to Laurence Z. Rubenstein, MD, GRECC-11E, VA Medical Center, 16111 Plummer Street, Sepulveda, CA 91343.

Syncope, or unexpected loss of consciousness, is an important cause of serious falls. There are two major causes of syncope: decreased cerebral blood flow and metabolic derangements. Cerebral blood flow can be decreased in many situations, including hypovolemia, autonomic insufficiency, venous pooling and cardiac dysfunctions (such as arrhythmias, heart block and aortic stenosis). Among the metabolic derangements leading to syncope are hypoglycemia, hypoxemia and acute acid base disturbances. A history of syncope is often difficult to obtain from the patient, who may not be able to recall losing consciousness, may attribute the fall to a trip or to a "drop attack" or may have an impaired memory or mental confusion. Thus, witnesses frequently provide key information.

Drop attacks are sudden unexpected falls without loss of consciousness or dizziness and usually involve a sudden flaccid weakness in the legs. Drop attacks are usually attributed to transient vertebrobasilar insufficiency. The leg weakness is transient but can persist for

hours. Sometimes tone and strength can be restored more rapidly by pushing the feet against a solid object. Recent data suggest that drop attacks are substantially less common than early studies had indicated.

Orthostatic hypotension, defined as a drop of more than 20 mm of systolic blood pressure between lying and standing, is extremely common in elderly persons, occurring in 20 percent to 30 percent of those living at home. It can arise because of several factors, including hypovolemia, venous pooling, autonomic dysfunction (often related to diabetes or central nervous system damage), low cardiac output, parkinsonism and certain drugs (including sedative, antihypertensive and antidepressant medications). The orthostatic drop may be more pronounced upon arising in the morning since blood volume tends to decrease during the night. Although orthostatic hypotension is common, it causes relatively few falls. It is likely to induce dizziness and a search for a seat rather than an abrupt fall. Also, people tend to have the symptom chronically and to adjust to it.

Falls associated with dizziness, giddiness or vertigo are extremely common. The patient usually has symptoms that reflect another underlying cause for the fall, such as cardiac dysrhythmia, orthostatic hypotension or cerebrovascular disease. However, the vertigo from vestibular dysfunction or drugs can certainly cause falls.

Diseases of the central nervous system, such as dementia, cerebrovascular disease, parkinsonism, seizures or gait disorders are often associated with falls. Drugs, including alcohol, are a causal or contributory factor in many falls. Especially important are sedative, antihypertensive, antidepressant, diuretic, and hypoglycemic agents, as well as alcohol. Other causes for falls include anemia, hypothyroidism, unstable joints and severe osteoporosis with spontaneous fractures.

Determining the exact cause or causes is frequently difficult. Most older persons who fall, as well as those who do not fall, have more than one of the many age-related or medical conditions that predispose to falls.

### Diagnostic Approach

Following stabilization of any acute problems brought on by the fall, such as head injury or fracture, the physician should undertake a careful diagnostic search for the underlying cause of the fall. A careful and well-directed history is the most important part of the diagnostic process for patients who have fallen. Obtaining a full report of the circumstances and symptoms of the fall is important, but often the patient has no or only a vague memory of it, and reports from witnesses may be the best that can be obtained. Terms like dizzy or giddy need to be defined clearly. There are several circumstances in the history that can point to a cause, including a sudden rise from a lying or sitting position (orthostatic hypotension), a trip or slip (gait disturbance or accidental fall), an unexplained drop attack without loss of consciousness (vertebrobasilar insufficiency) and looking up or sideways (arterial compression). Symptoms experienced near the time of

TABLE 1.—Major Causes of Falls in the Elderly

- "Accidents"
- Syncope (sudden loss of consciousness)
- "Drop attacks" (sudden falls without loss of consciousness)
- Orthostatic hypotension
- Dizziness/vertigo
- Neurologic dysfunctions
- Drugs (especially sedative, antihypertensive, diuretic and hypoglycemic agents, as well as alcohol)

TABLE 2.—Factors Associated With Falls at Home

- Unstable furniture and appliances
- Creaky stairs with poor rails
- Throw rugs and frayed carpets
- Poor lighting
- Low beds and toilets
- Pets
- Objects on floor

TABLE 3.—Factors Associated With Falls Among Elderly Persons in Institutions

- Recent admission or transfer
- Daytime sedation
- Hazardous furniture
- Slick hard floors
- Unsupervised activities
- Reduced number of nurses

TABLE 4.—Approaching the Patient Who Fell

- Assess and treat injury
- Determine probable cause of fall
  - History
  - Physical examination
  - Laboratory and other tests (such as complete blood count, serum electrolyte studies, electrocardiograms, Holter monitor)
- Prevent recurrence
  - Treat underlying illness
  - Reduce environmental hazards (home assessment)
  - Teach adaptive behavior (for example, slow rising, gait training, cane or walker use, falling techniques, getting-up techniques)

falling may also point to a cause: dizziness or giddiness (orthostatic hypotension, vestibular problem, hypoglycemia, drugs), palpitations (arrhythmia), incontinence or tongue biting (seizure), asymmetric weakness (stroke or transient ischemic attack), chest pain (myocardial infarction) or loss of consciousness (syncope). Also important to note are medications taken and existence of concomitant medical problems. (See Table 4.)

Physical examination can also point to causes for a fall and confirm or refute possible causes suggested by the history. Especially important to look for are orthostatic changes in pulse and blood pressure, arrhythmias, carotid bruits, nystagmus, focal neurologic signs, muscle weakness, joint deformities, unsafe footwear, visual loss, gait disturbances and occult blood in the stool. It is also frequently useful to attempt, under carefully monitored conditions, to reproduce the circumstances associated with the fall, such as positional changes, head turning, urination or carotid pressure.

The laboratory evaluation need not be extensive, but should include several tests in all patients in whom the cause is not obvious. Although the diagnostic yields of specific tests in evaluation of falls have not been well documented, several tests which can uncover etiologic factors are probably indicated. These include a complete blood count (to search for anemia or infection), serum chemistry determinations (for example, sodium, potassium, calcium, glucose and blood urea nitrogen values) and an electrocardiogram (to document arrhythmia or heart block). Thyroid function tests are also indicated if any suspicion of thyroid dysfunction exists.

Unfortunately, maneuvers or tests done at the time of the medical evaluation may not detect an intermittent problem that occurred at the actual time of the fall. In particular, orthostatic changes, arrhythmias, heart block, hypoglycemia or electrolyte disturbances may not be detected when the patient is examined. These tests may have to be repeated if the history or physical examination suggests an intermittent cause. An ambulatory cardiac (Holter) monitor is advisable when a transient arrhythmia is suspected or in the case of otherwise unexplained syncope. The likelihood of finding suggestive abnormalities on Holter monitoring in older persons who fall is particularly high. In one small series, 32 percent had arrhythmias documented on Holter monitoring which were felt to be responsible for falls. Of these, only a sixth had evidence of the arrhythmia on the initial resting electrocardiogram. Because the prevalence of transient arrhythmias is high in the asymptomatic elderly population it is often unclear whether an abnormality detected on the monitor caused the fall, unless corresponding symptoms were noted during the monitoring process.

## Therapy and Prevention

Once the cause for a fall is determined, therapy can be appropriately instituted. For example, cardiac dysrhythmias that have been clearly related to a fall should be treated with antiarrhythmics or a pacemaker, or both. Hypovolemia from hemorrhage needs treatment di-

rected toward the bleeding site and toward restoring hemodynamic stability. More difficult is managing and preventing recurrent falls in patients who do not have easily reversible causes for the falls.

Patients with gait disturbances can often benefit from using a walker or cane or from gait training from a physical therapist. Special shoe modifications can often improve safety.

Patients with persistent orthostatic hypotension from autonomic dysfunction often benefit from sleeping in a bed with the head raised to minimize sudden drops in blood pressure on arising, from elastic stockings to minimize venous pooling in the legs and from instructions to rise slowly or to sit on the side of the bed for several minutes before standing up. Increasing circulating blood volume with additional dietary salt or mineralocorticoids may also be helpful if care is taken not to precipitate or worsen congestive heart failure or hypertension.

Persons subject to drop attacks from vertebrobasilar insufficiency associated with head motion may be helped by a cervical collar.

A careful search for and correction of other medical factors that contribute to falling (such as visual and hearing deficits) are essential. Where irreversible problems exist, residual limitations should be explained and coping methods developed. For example, patients with neurologic defects often derive great benefit from assessment and specific therapy from rehabilitation specialists such as occupational and physical therapists.

A home assessment by a visiting nurse or other trained health-care worker can suggest appropriate modifications of the home environment. Such modifications include elimination of hazards (loose or frayed rugs, trailing electric cords, unstable furniture) and environmental improvements (improved lighting, grab rails in the bathroom, secure banisters, raised toilet seats, an alarm system). Such environmental modifications are probably useful in the homes of most elderly persons. Indirect data to support this practice come from institutional studies. Institutions that are specially designed to meet the needs and vulnerabilities of older persons have substantially lower accident rates than those designed without such special attention.

Since a third to two thirds of falls in elderly people are probably preventable with careful medical attention and environmental improvements, a vigorous systematic diagnostic, therapeutic and preventive evaluation is appropriate in all older patients. Any reduction in the fifth leading cause of death in the elderly will clearly have major impact.

## GENERAL REFERENCES

- Cape R: Falling, chap 6, *In* Aging: Its Complex Management. Hagerstown, MD, Harper & Row, 1978, pp 113-116
- Gordon M, Huang M, Gryfe CI: An evaluation of falls, syncope, and dizziness by prolonged ambulatory cardiographic monitoring in a geriatric institutional setting. *J Am Geriatr Soc* 1982; 30:6-12
- Health, United States 1980; With Prevention Profile, DHHS publication No. (PHS)81-1232. Hyattsville, MD, US Dept of Health and Human Services, 1980, pp 312-314
- Morfit JM: Residential homes for the elderly—Which are the safest? *Public Health* 1980 Jul; 94:223-228
- Overstall PW: Falls in the elderly—Epidemiology, aetiology and management, *In* Isaacs B (Ed): Recent Advances in Geriatric Medicine. New York, Churchill Livingstone, 1978, pp 61-72
- Rodstein M: Accidents among the aged: Incidence, causes and prevention. *J Chron Dis* 1964; 17:515-526